

The effect of transport on carcass quality 310 and welfare of red deer (*Cervus elaphus*)

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The period of handling prior to slaughter is often stressful and a time when animal welfare is at risk. This may result in reduced carcass quality and poor meat quality. Carcass bruising is an economic and welfare issue of concern to the deer industry. Our initial surveys have suggested that some bruising occurs during transport. In this study likely causes and measures of bruising were investigated.

Nine groups of six red deer hinds (*Cervus elaphus*) were transported a range of distances (80, 230 or 400km) that were representative of current commercial practice. Behaviour during transport was recorded by a closed-circuit video camera positioned directly above the pen, blood samples were collected pre-transport and post-stunning and the carcasses were assessed for bruising. Hot carcass weight (HCW), tissue depth over the twelfth rib (GR) and pH_u were measured.

Losses of balance, the number of impacts and movements by animals were greatest at the start of the journey and on steep, winding roads. Agonistic behaviour was initiated by the heavier animals and directed at the lighter animals. With the exception of one animal, deer did not lie down during the first 60 minutes of the journey.

The incidence of lying increased with increasing distance. Muscle pH measured in the leg was consistently and significantly lower than that measured in the neck (mean difference (s.e.) was 0.417 (0.015), $p < 0.01$). Both leg and neck pH tended to decrease with increasing distance transported. The concentrations of creatine kinase (CK), aspartate aminotransferase (AST), glucose, lactate, cortisol, total lactate dehydrogenase (LDH), LDH3, LDH4, LDH5 increased and magnesium decreased from the time of first to second sample. As the time from first (start of transport) to second (end of transport) sample increased, there were further increases in concentrations of plasma CK, total LDH, LDH5, LDH3 and LDH2. Carcass bruising score was positively correlated with CK ($r=0.70$, $p<0.001$), AST ($r=0.60$, $p<0.001$), LDH4 ($r=0.55$, $p<0.001$) and LDH5 ($r=0.70$, $p<0.001$), indicating that these biochemical parameters are potential measures of bruising.

This study shows that deer can be transported considerable distances with little compromise to welfare and carcass quality, especially if particular care is taken when grouping animals and during vulnerable stages of the journey.